

Q&A sheet

1. Q: What the timeline of the Project in your view?

A: Node units need to be done by this semester and a hub unit and tests need to be done by next semester. However, it is hard to test the system without a hub unit and node units.

2. Q: What sort of smart processing of the unit in sensor node?

A: It depends on the applications and prefers to have tiny ones.

3. Q: What kind of function do you want to realize in the user interface programs?

A: The user interface program need to computer to visualize the data (at least showing the data) received by hub.

4. Q: What's the time tolerance of the sensor node response. Does it have to response immediately?

A: The response with lowest latency as possible is preferred. It depends on the sensors' listening algorithms and power consumption.

5.Q: What the difference between an infinite sensor network and a general computer network ?

A: They have many similarities. The node network uses star network and requires handshaking which means need CRC code to detect errors.

6. Q: What are the recommendations for the equipment to minimize budget expense?

A: Well, build your own PCB and system will generally reduce the budget. But, sometimes buying modules is cheaper and saving time. There is no restriction.

7. Q: How to adjust the upload data rate ?

A: Hub should have a fixed data rate which requires synchronous rate with other nodes. This can be difficult. 100k bit/s can be the maximum data rate.

8. Q: Tips for designing a microcontroller function ?

A: You can look for the IDEs of the microcontrollers. Typically they are in C, C++ or other languages.

9. Q: What is the max size of the node?

A: For the size of the system, the minimum number for nodes is three. For the physical size of the node, smaller is preferred and it can be 10x10 cm or 5x5 cm. There is no strict requirements.

10. Q: which signal does the sensor need to record? like temperature, humidity?

A: They can be varied and depend on applications. For example, you can use a human detecting sensor and a photodiode to calculate how much light (electricity) is wasted when people leave the room.

11. Q: The modules on the PCB board do we need to design them? or can just buy some to install on the PCB board?

A: It depends on the design methods you want to do. If you have experience of designing a PCB, just use PCB.

12. Q: Does the communication just between node and OWC hub or include node to node?

A: For this project, it doesn't need to be. Star network is required.

13. Q: This question may be not connected to our project, but our team did some research shows that the Beam-steered IR light communication (BS-ILC) seems more efficient and has better privacy. However, in real life the VLC already has a commercial product and the BS-ILC still in the laboratory stage. Why?

A: It is hard to do Beam-steering because you need to change the angle of mirrors for the beam and it has a lot of challenges.

14. Q: During our research, we figured out we need LED driver to control the LED on the transmitter site. I noticed the driver in the market costs around \$60 and power consumption is around 10w, should we purchase the driver or build by ourselves?

A: Mostly, they are commercial products which do LED texture. However, for this project, it focuses the LED communication. The driver is not that complicated. The simple way is to use transistors to implement it.

15. Q: In general, which blocks have designing priority than others or which blocks do you want us to start with?

A: The most important thing is the algorithm. Based on that, you can determine the system and design methods.

16. Q: From our current knowledge, we can design a high-speed transmission. However, we don't know if it is possible to make these tags off grid. Would you want to emphasize more on the power consumption side?

A: Node units need to be deployable therefore it cannot use power from outlet. To reduce the power consumption, you can synchronize all the units to save power on the receivers.

17. Q: Would you accept to use a microcontroller to control transmitter and receiver on the ID TAG?

A: You can use small microcontrollers to build these nodes.

18. Q: We reviewed some paper, for VLC systems, they used RGB LED to enhance the bandwidth. They mentioned about CAP (carrier less amplitude and phase) modulation

and demodulation as well as spatial communication algorithms. Should we follow this side or use commercial products to design our system?

A: There are RGB LED available in the market. You can choose it but RGB requires three IO to control three LEDs which increases the power. For the modulation, you can check OOK(on-off keying) which is the simplest one.